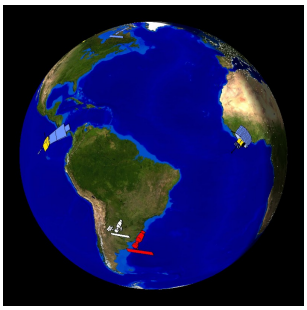
Science On a Sphere®
National Oceanic and Atmospheric Administration

All Satellites

Description



Media Preview

Satellites are a key tool for scientists to monitor and observe the Earth's atmosphere from space. **Geostationary satellites** orbit around the Earth at the same rate as the Earth rotates so that the satellites are over the same spot on Earth all the time. This allows them to collect a continuous stream of data for one location so that "movies" of the data can be made. The satellites are positioned 22,300 miles above the Earth's surface in order to view the Earth's full disk and to maintain their geostationary orbit. Geostationary satellites travel at about 7000mph in order to maintain their geostationary orbit. In addition to geostationary satellites, scientists also use **polar orbiting satellites**. These satellites circle the Earth, crossing the poles on each orbit. Typically, polar orbiting satellites are about 500 miles above the Earth's surface. The satellites travel at almost 17,000mph, allowing them to orbit the Earth in roughly 100 minutes. A polar orbiting satellite is able to cover the whole Earth in less than one day.

There are hundreds of scientific satellites orbiting the Earth. This dataset shows the positions of seven geostationary satellites and the tracks of several polar orbiting satellites, plus the location of the International Space Station over one day, February 15, 2007. The day/night terminator is also included in this dataset. Each of the polar orbiting satellites travel at slightly different heights, allowing them to pass by one another without crashing.

Details

Category
Atmosphere

Audio
Yes

Dataset Source
Rick Kohrs, SSEC, Space, Science, and Engineering Center

Dataset Developer
Rick Kohrs, SSEC, Space, Science, and Engineering Center

Visualization Developer
Rick Kohrs, SSEC, Space, Science, and Engineering Center

Contact
Rick Kohrs

Directory
FTP Link

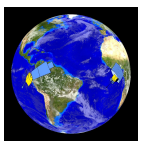
KML
KML File

Keywords
NOAA, GOES, EUMETSAT, JMA, geostationary, polar orbiting, satellites, International Space Station

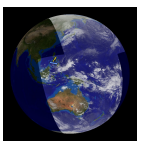
Notable Features

- **Geostationary Satellites**
  - NOAA's GOES-West - 135° West
  - NOAA's GOES-East - 75° West
  - EUMETSAT's Meteosat-9 - 0°
  - EUMETSAT's Meteosat-7 - 57° East
  - ISRO's INSAT-3C - 74° East
  - CMA's FY2C - 105° East
  - JMA's MTSAT-1R - 140° East
- **Polar Orbiting Satellites**
  - Blue - NOAA-17 and NOAA-18
  - Yellow - Defense Meteorological Satellite Program
  - Red - NASA, large ones are Terra and Aqua, small one is TRMM (notice the different orbit type)
- White - **International Space Station**

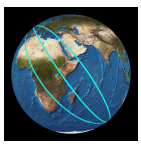
Related Datasets



Geostationary Satellites



Polar Orbiting Satellite Coverage



International Space Station Track

Science On a Sphere®
National Oceanic and Atmospheric Administration

Blue Marble (23 degree tilt)

Description

Media Preview

The Blue Marble is an incredibly detailed, true-color depiction of the Earth. NASA is responsible for this dataset made from a compilation of satellite images throughout 2001. Most of the information came from NASA's MODIS, the Moderate Resolution Imaging Spectroradiometer, which is attached to the Terra satellite 435 miles above Earth. The background image of the land and oceans was created using data from June through September of 2001. This could not be done in a single day or even a week because on any given day clouds are blocking a significant portion of the surface. The cloud image is a composite of three days worth of data. The first two days of data were collected in the visible wavelength and the third day was needed to get a view of the clouds over the poles using thermal infrared imagery.

The shading is true color with the oceans shades of blue, the clouds white and the lands varying from green to brown. The brown areas are the sands of the deserts. The shading of the land was done using a dataset compiled by the U.S. Geological Survey's Earth Resources Observation and Science Data Center.

Additional Blue Marble datasets are available to highlight some of the characteristics of the changing Earth. The standard Blue Marble is a year long composite to show an average view of the earth. The Blue Marble without clouds is also available in monthly composites the entire year. This monthly evolution is the seasonal blue marble. The monthly evolution allows audiences to see the changing appearance of the Earth due to the season changes. The most dramatic change is the expansion of the snow cover during the winter months and then the depletion of it during the summer months. **Blue Marble: Next Generation** provides an updated version of the seasonal changes dataset. The Blue Marble is also available without the cloud cover so that the vegetation can be clearly seen. This dataset has also been merged with the **Nighttime Lights** dataset, to create a new dataset. The new dataset shows the Earth with daytime and nighttime views of the Earth, to demonstrate how only half of the Earth is illumintated at one time.

Details

Category
Land

Audio
Yes

Dataset Source
NASA Goddard Space Flight Center

Dataset Developer
NASA Goddard Space Flight Center

Visualization Developer
NASA

Contact
Beth Russell

Directory
FTP Link

Keywords
Land, Solar System, Earth, Blue Marble

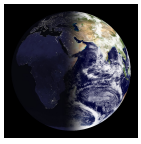
Notable Features

- Vastness of the Sahara Desert
- Shading done in true color: gives Earth's appearance from space

Related Datasets

Seasonal Blue Marble

Earth with Vegetation

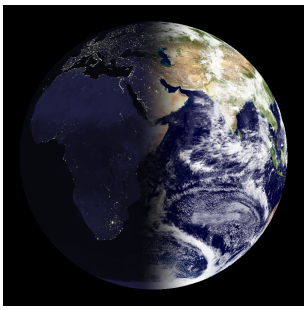


Blue Marble and Nightlights

Science On a Sphere®
National Oceanic and Atmospheric Administration

Blue Marble and Nightlights

Description



Media Preview

The Blue Marble is an incredibly detailed, true-color depiction of the Earth. NASA is responsible for this dataset made from a compilation of satellite images throughout 2001. Most of the information came from NASA's MODIS, the Moderate Resolution Imaging Spectroradiometer, which is attached to the Terra satellite 435 miles above Earth. The background image of the land and oceans was created using data from June through September of 2001. This could not be done in a single day or even a week because on any given day clouds are blocking a significant portion of the surface. The cloud image is a composite of three days worth of data. The first two days of data were collected in the visible wavelength and the third day was needed to get a view of the clouds over the poles using thermal infrared imagery.

The shading is true color with the oceans shades of blue, the clouds white and the lands varying from green to brown. The brown areas are the sands of the deserts. The shading of the land was done using a dataset compiled by the U.S. Geological Survey's Earth Resources Observation and Science Data Center.

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Details

Category
Land

Audio
No

Dataset Source
NASA GSFC, DMSP

Dataset Developer
NASA GSFC, NGDC Earth Observations Group

Visualization Developer
Steve Albers, NOAA/GSD

Contact
Steve Albers

Directory
FTP Link

Keywords
Land, Solar System, Earth, Blue Marble

Notable Features

- Vastness of the Sahara Desert
- Shading done in true color: gives Earth's appearance from space

Related Datasets

Blue Marble (23 degree tilt)

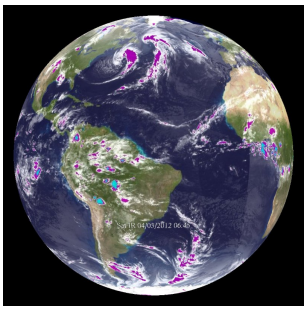
Seasonal Blue Marble

Earth with Vegetation

Science On a Sphere®
National Oceanic and Atmospheric Administration

Real-time: Color Enhanced Infrared Satellite

Description



Media Preview

Infrared satellite images are used by meteorologists to determine where clouds are, but more importantly, how the clouds are moving. The infrared, IR, satellites work by measuring the infrared radiation that is emitted. Because the emitted radiation is proportional to temperature, the data are converted to temperature values, which can be useful for meteorologists. In comparison to clouds, the Earth's surface, even on very cold nights, is warm. When there are clouds, they absorb the radiation emitted by the Earth below and emit their own radiation at a much cooler temperature. Any area that has clouds shows up cooler than the ground, allowing meteorologists to detect the locations of the clouds. The height of clouds is inversely proportional to temperature, meaning that the tallest clouds are the coldest. It is often the tallest clouds that bring the most severe weather.

The satellites that collect these data are geostationary, meaning that they rotate at the same rate as the Earth so that the satellites are over the same spot on Earth all the time. This allows them to collect a continuous stream of data for one location so that "movies" of the data can be made. Over the United States there are two such satellites, the GOES (Geostationary Operational Environmental Satellites) -East and GOES-West. World wide there are many such satellites. This dataset is a composite of GOES, Meteosat, and GMS satellite data. Meteosat and GMS are similar to GOES, but operated by other countries. This real-time, color enhanced dataset is shaded so that the significant clouds are brightly colored in order to stand out from the surface. The lowest clouds are white, medium level clouds are shades of purple, and the highest clouds are teal. The background of this image is the "Blue Marble." The data is constinently updated so that the past thirty days of data are available.

Also available is a collection of biweekly IR satellite interpretations by NOAA scientists that can be used with this dataset. The interpretations are plain-language descriptions of notable climate and weather events visible in the cloud patterns of the two-week period indicated. Interpretations are posted every other Tuesday, and are available for the past six months. The interpretations are made available by the American Museum of Natural History, NOAA Climate Prediction Center, and NOAA National Climatic Data Center. To request access to this Google Docs collection please write Laura Allen at laura@amnh.org.

Details

Category
Atmosphere

Audio
No

Dataset Source
MTSAT

Dataset Developer
Fred Mosher, AWC Steve Albers, NOAA/GSD

Visualization Developer
Steve Albers, NOAA/GSD

Contact
Steve Albers

Directory
FTP Link

Keywords
Atmosphere, IR satellite, real-time, color enhanced, satellite

Notable Features

- Lowest clouds white, medium level clouds purple, and highest clouds teal
- Available in real-time

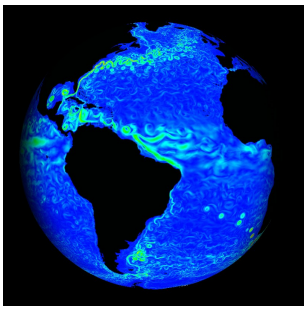
Related Datasets

(None)

Science On a Sphere®
National Oceanic and Atmospheric Administration

NASA Sea Currents

Description



Media Preview

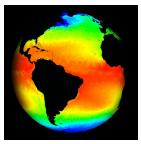
The water in the ocean is constantly moving. Ocean currents are typically driven by surface wind and can have a huge impact on climate. Northwest Europe is moderately temperate considering its latitude because the Gulf Stream off of the eastern coast of the United States transports warm water north to those areas. In fact, the Atlantic Ocean along the U.S. coast is much warmer than the Pacific Ocean along the U.S. coast because of the warm water transported in the Gulf Stream. In this visualization, a model created by NASA, the color variations denote speed. The lighter green areas are moving faster than the blue areas.

Along most of the coasts, where the water faces an obstacle, the water's velocity increases and eddies form. Eddies (small whirlpools) are most readily seen in streams, where they form behind rocks as the water flows around them. The eddies in the ocean follow the same priniciple, but are so large that they are hard to detect. Eddies can also spin off at the edges of currents as they travel through the oceans. An almost constant string of eddies is visible off of the northern coast of South America as an equatorial current from Africa crashes into South America. Eddies are also visible off of many islands around the world.

Notable Features

- The Gulf Stream winding its way along the east coast of the U.S.
- Eddies forming along almost all the coasts

Related Datasets



NASA Sea Surface Temperatures

Details

Category
Ocean

Audio
Yes

Dataset Source
Los Alamos National Labs and the Naval Postgraduate School

Dataset Developer
Los Alamos National Labs and the Naval Postgraduate School

Visualization Developer
Los Alamos National Labs and the Naval Postgraduate School

Contact
Beth Russell

Directory
FTP Link

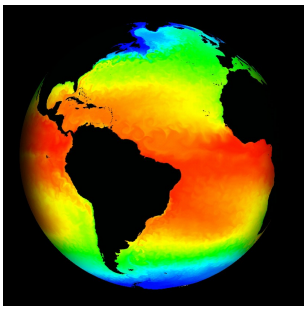
KML
KML File

Keywords
Ocean, model, NASA, current, eddy

Science On a Sphere®
National Oceanic and Atmospheric Administration

NASA Sea Surface Temperatures

Description



Media Preview

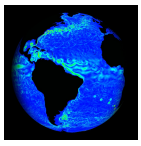
" Sea surface temperature plays a vital role in the behavior of the Earth's climate and weather. It is both a causal factor and a resulting effect of complex interactions of natural forces on Earth. NASA not only measures sea surface temperature from space using powerful scientific instruments, but it also studies temperature processes in advanced computer models." -Gretchen Cook-Anderson, Goddard Space Flight Center

While the coldest areas remain at the poles and the warmest area remains at the Equator, many of the seasonal variations linked to the ocean are visible in this dataset generated by a NASA computer model. The warmest water, which is shaded red, can be seen expanding from the equator during the summer. The East Coast of the U.S. warms steadily during the summer months and then cools in the fall and winter. Ocean currents are also visible, such as the Gulf Stream, which transports warm Gulf of Mexico water up the East Coast. Along the edges of many of the currents, ocean eddies (small whirlpools) can be seen mixing and dispersing the temperature gradients. Ocean eddies also appear along coasts, where land is an obstacle in the path of the water.

Notable Features

- North/South temperature gradient
- Seasonal variations in ocean temperature
- Currents and eddies

Related Datasets



NASA Sea Currents

Details

Category
Ocean

Audio
No

Dataset Source
Los Alamos National Labs and the Naval Postgraduate School

Dataset Developer
Los Alamos National Labs and the Naval Postgraduate School

Visualization Developer
Los Alamos National Labs and the Naval Postgraduate School

Contact
Beth Russell

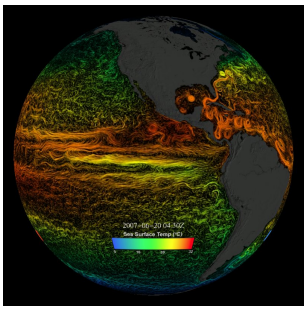
Directory
FTP Link

Keywords
Ocean, sea surface temperature, current, eddy, model

Science On a Sphere®
National Oceanic and Atmospheric Administration

Sea Surface Currents and Temperature with Gray Land

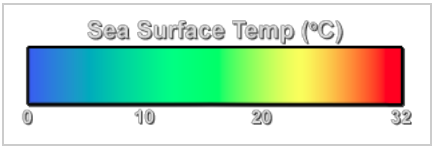
Description



Media Preview

To increase understanding and predictive capability for the ocean's role in future climate change scenarios, the NASA Modeling, Analysis, and Prediction (MAP) program has created a project called Estimating the Circulation and Climate of the Ocean, Phase II (ECCO2): High-Resolution Global-Ocean and Sea-Ice Data Synthesis. ECCO2 produces increasingly accurate syntheses of all available global-scale ocean and sea-ice data at resolutions that start to resolve ocean eddies and other narrow current systems, which transport heat, and other properties within the ocean. ECCO2 data syntheses are created by using the available satellite and in-situ data in the Massachusetts Institute of Technology General Circulation Model (MIT GCM). ECCO2 simulates ocean flows at all depths, but only surface flows are used in this visualization. The global sea surface current flows are colored by corresponding sea surface temperatures. The sea surface temperature data is also from the ECCO2 model.

These surface flows and temperatures represent only the top few meters of the oceans. They are primarily driven by the surface winds, traveling at about 3% of the speed of the winds. The distribution of solar energy from the equators to the poles also contributes to the currents, with the oceans responsible for 40% of the global heat transport.

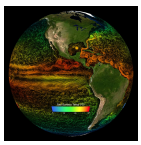


The dominant features are the five subtropical gyres caused by the surface winds. These gyres are centered around high pressure zones in the North Atlantic, North Pacific, South Atlantic, South Pacific, and the Indian Ocean. Circulation moves clockwise in the northern hemisphere, and counterclockwise in the southern hemisphere. The ocean circulations close to the equator are primarily east to west, again, in the direction of the surface winds. The rotating gyres include a northward flow in the western Atlantic and western Pacific moving the warm waters toward the north pole. The cooler waters flow south in the eastern Pacific and Atlantic in its return to the equator. There is one primary circulation in the Indian Ocean about the equator with seasonal variability. Below about 50 degrees south is the eastward circumpolar current around Antarctica, following the direction of the surface winds similar to the other major current systems. This visualization shows the ocean surface currents and temperatures around the world from March 2007 through March 2008.

Notable Features

- The visualization is a synthesis of all available global-scale ocean and sea ice data
- The global sea surface current flows are colored by corresponding sea surface temperature
- There are five subtropical gyres caused by the surface winds centered around high pressure zones in the North Atlantic, North Pacific, South Atlantic, South Pacific, and the Indian Ocean.

Related Datasets



Sea Surface Currents and Temperature with Veg Land

Details

Category
Ocean

Audio
No

Dataset Source
NASA Modeling, Analysis, and Prediction

Dataset Developer
NASA Modeling, Analysis, and Prediction

Visualization Developer
NASA Scientific Visualization Studio

Contact
NASA Scientific Visualization Studio

Directory
FTP Link

Keywords
Ocean, sea surface temperature, currents, circulation, model, NASA, ECCO2

Science On a Sphere®
National Oceanic and Atmospheric Administration

Ocean Conveyor Belts Animation

Description

Media Preview

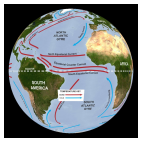
The ocean is not a still body of water. There is constant motion in the ocean in the form of a global ocean conveyor belt due to thermohaline currents. These currents are density driven, which are affected by both temperature and salinity. Cold, salty water is dense and sinks to the bottom of the ocean while warm water is less dense and rises to the surface. The "start" of the ocean conveyor belt is in the Norwegian Sea. Warm water is transported to the Norwegian Sea by the Gulf Stream. The warm water provides heat for the atmosphere in the northern latitudes that gets particularly cold during the winter. This loss of heat to the atmosphere makes the water cooler and denser, causing it to sink to the bottom of the ocean. As more warm water is transported north, the cooler water sinks and moves south to make room for the incoming warm water. This cold bottom water flows south of the equator all the way down to Antarctica. Eventually, the cold bottom waters are able to warm and rise to the surface, continuing the conveyor belt that encircles the global. It takes water almost 1000 years to move through the whole conveyor belt.

There are two datasets that illustrate the ocean circulation. The first dataset is an animation that shows the movement of the ocean conveyor belt and the second dataset is a still image that has the major ocean currents labeled. In both datasets, surface waters are the red lines and cold, bottom waters are the blue lines. Changes in ocean circulation could have drastic impacts on the climate. The transport of heat associated with the ocean conveyor belt partially moderates the cold temperatures in the North. As the poles warm due to climate change, melt water from ice and glaciers enters the ocean. This fresh melt water has the potential to slow or even shut off the ocean circulation, which is dependent on temperature and salinity. The density of the fresh melt water is less than that of salty ocean water. This causes the fresh melt water to form a layer on the surface that can block the warm, salty ocean water from transporting heat to the atmosphere. The effect would be a cooling of the higher latitudes. If the warm water is not able to give off heat, it can not cool and sink to the bottom of the ocean. This would disturb the circulation of the entire ocean conveyor belt and have a noticeable impact on the climate in the northern latitudes.

Notable Features

- Cold bottom currents are blue, warm surface currents are red
- Transport through the whole conveyor belt can take up to 1000 years
- Currents are labeled in the Ocean Circulation dataset

Related Datasets



Ocean Circulation

Details

Category
Ocean

Audio
No

Dataset Source
NASA Goddard Space Flight Center

Dataset Developer
NASA Goddard Space Flight Center

Visualization Developer
NASA Goddard Space Flight Center

Contact
NASA Goddard Space Flight Center

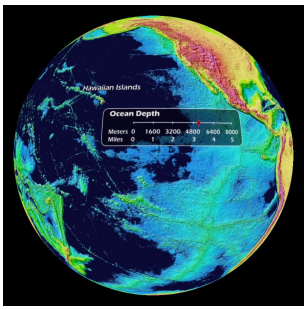
Directory
FTP Link

Keywords
Ocean, conveyor belt, currents, climate change

Science On a Sphere®
National Oceanic and Atmospheric Administration

Ocean Drain with Etopo Background

Description



Media Preview

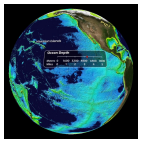
Beneath the sea surface is an amazing sea floor that contains mountain ranges, trenches and plains. The ocean covers 71% of the Earth's surface, has an area of 139,400,000 square miles and an average depth of 2.3 miles. Due to this vast size, only a few percent the sea floor has been mapped by ships. Maps of the sea floor are created by combining soundings from ships, sonar scans from ships, and gravity anomalies in the sea surface detected by satellites.

This dataset gradually reveals the sea floor as the ocean is "drained." The scale in the dataset shows the distance below sea level in meters and miles. As selected features are revealed, a label appears. For this animation, the labeled areas include Mariana Trench, Tonga Trench, Puerto Rico Trench, Hawaiian Islands, Grand Banks, Mid-Atlantic Ridge and Ninety East Ridge. The deepest area in the ocean is the Mariana Trench, which is 6.86 miles (11,033 meters) deep. The longest mountain range in the world is the Mid-Atlantic Ridge, which runs through the middle of the Atlantic Ocean. There are two versions on this dataset that are fully labeled with a colorized seafloor based on bathymetry, one with the land shaded in true color and one with the land shaded based on elevation. A third version of this dataset is available with no labels and the land shaded in true color with the oceans shaded gray.

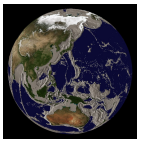
Notable Features

- Several prominent ridges and trenches are identified
- The scale shows the distance below sea level in meters and miles
- The deepest part of the ocean is in the Mariana Trench at 6.86 miles below sea level

Related Datasets



Ocean Drain with Land Background



Ocean Drain with Gray Ocean Floor

Details

Category
Ocean

Audio
No

Dataset Source
Walter Smith, NOAA

Dataset Developer
Walter Smith, NOAA

Visualization Developer
Dan Pisut, NOAA Environmental Visualization Lab

Contact
Walter Smith

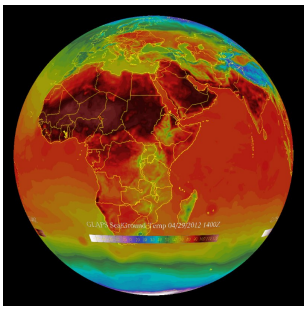
Directory
FTP Link

Keywords
Ocean, sea floor, topography, mapping

Science On a Sphere®
National Oceanic and Atmospheric Administration

Real-time: GLAPS Sea Surface / Ground Temperature (F)

Description



Media Preview

The Global Analysis and Prediction System, GLAPS, produces maps for several weather parameters over a large global domain. There are seven GLAPS products available for Science On a Sphere®. It is important for meteorologists to know the current conditions, not only in their local area, but also globally. A computer model is used to create a first guess as to what the map should look like, and then observations are added to enhance the map. The observations come from Doppler radars, satellites, wind and temperature profilers, radiometric profilers, as well as aircraft. GLAPS is such a powerful tool because of its ability to consolidate observations from so many different sources. The GLAPS datasets are available in real-time, updating hourly, and include the data for the past week.

One of the seven GLAPS datasets is not real-time. It is a map of the fraction of the Earth that is green during the year. This dataset shows how the "green fraction" changes during the year from January to December. Brown areas have no vegetation while greener areas represent vegetation. The other six GLAPS datasets all update hourly. The first is a map of the ground and sea surface temperature in degrees Fahrenheit. The second map shows surface air temperature as an image with surface air temperature contours and wind barbs overlaid. The third map is an image of the wind speed at 500mb in knots with wind barbs and 500mb height contours overlaid. The fourth map is similar to the third, but is for the surface. It is an image of the wind speed in knots at the surface with wind barbs and the surface pressure contours overlaid. The fifth map is an image of integrated water vapor (IWV) in centimeters. The sixth map is a radar reflectivity image that contains radar data from the National Weather Service in the United States and the Central Weather Bureau in Taiwan. Radar data is currently unavailable for other countries. Colorbars for each of the datasets are below. Click the colorbars to watch videos of the datasets

Details

Category
Atmosphere

Audio
No

Dataset Source
NOAA GLAPS

Dataset Developer
Steve Albers NOAA/GSD

Visualization Developer
Steve Albers NOAA/GSD

Contact
Steve Albers

Directory
FTP Link

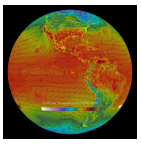
Keywords
Real-time, GLAPS, weather model, precipitable water, temperature, wind, pressure

Notable Features

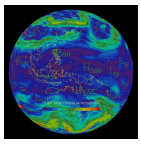
GLAPS Sea Surface / Ground Temperature in °F (1mb)

Related Datasets

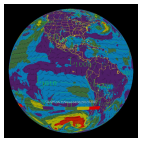
Real-time: GLAPS Green Fraction



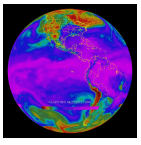
Real-time: GLAPS SFC Temperature (F) + Wind (kt)



Real-time: GLAPS 500mb Height + Wind + Windspeed (kt)



Real-time: GLAPS SFC Pressure + Wind + Windspeed (kt)

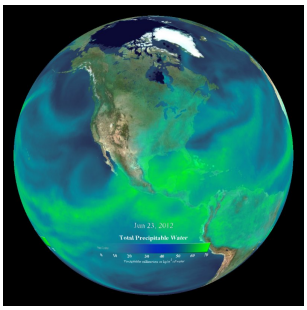


Real-time: GLAPS Total Precipitable Water (cm)

Science On a Sphere®
National Oceanic and Atmospheric Administration

Real-time: Total Precipitable Water

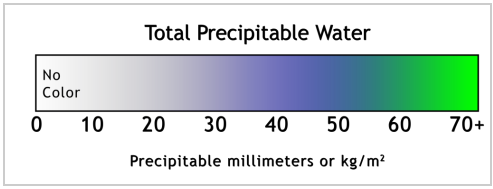
Description



Media Preview

The atmosphere contains an enormous amount of moisture that circulates around the globe. However, not all of it actually condenses into rain, sleet, or snow since the right balance of pressure and temperature are needed to create precipitation. Total precipitable water (TPW) in the atmosphere is the amount of water that can be obtained from the surface to the "top" of the atmosphere if all of the water and water vapor were condensed to a liquid phase. Significant features that can be identified in TPW data are the atmospheric rivers that flow off the oceans and onto coastal land areas. A famous example is the Pineapple Express that forms in the Northeast Pacific and impacts the Northwest United States. Also notice how TPW values are much greater over the equator and ocean. High levels of evaporation in these areas are one of the primary drivers of atmospheric circulation.

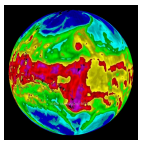
The land, ocean, and atmosphere all emit microwave radiation which can be measured by sensors on satellites, allowing scientists to study various aspects of the Earth. Microwave sounders are able to measure very low levels of microwave radiation naturally emitted by the Earth at different frequencies. Even water vapor emits microwave radiation that can be measured by microwave sounders. There are two datasets for TPW for Science On a Sphere. The first dataset uses data from the Advanced Microwave Sounding Unit, AMSU, which is attached to the NOAA Polar Environmental Orbiting Satellites NOAA 15, NOAA 16, and NOAA 17. Each satellite provides full coverage of the Earth everyday by orbiting the globe 14.1 times per day collecting a swath of data 1426 miles wide on each orbit. The second dataset uses data from the AMSU and the Special Sensor Microwave Imager, SSM/I, which is carried on Defense Meteorological Satellite Program satellites. Both are provided in near real-time. The AMSU dataset is updated hourly and the AMSU/SSMI combined dataset is updated daily.



Notable Features

- Tropics generally have high total precipitable water
- Areas of high total precipitable water typically indicated clouds and precipitation

Related Datasets



Real-time: NESDIS AMSU - Precipitable H2O

Details

Category
Atmosphere

Audio
No

Dataset Source
Advanced Microwave Sounding Unit Project and Special Sensor Microwave Imager

Dataset Developer
NOAA Visualization Lab

Visualization Developer
NOAA Visualization Lab

Contact
NOAA Visualization Lab

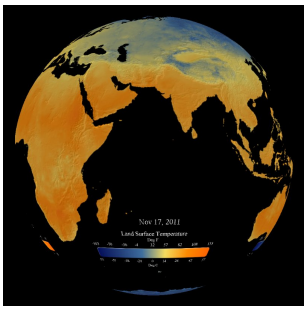
Directory
FTP Link

Keywords
Atmosphere, total precipitable water, satellite

Science On a Sphere®
National Oceanic and Atmospheric Administration

Real-time: Land Surface Temperature

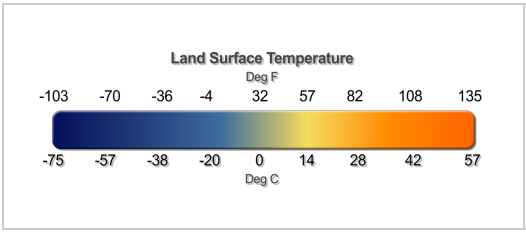
Description



Media Preview

Touch the ground and you will feel the land surface temperature. Satellites can also measure this temperature from space, and that data is plotted here. Though related, land surface temperature is not the same as air temperature since the land surface heats and cools more quickly than air. Land surface temperature is also greatly influence by land use and cover: bare, un-vegetated lands such as deserts are able to heat up to much greater temperatures than areas at the same latitude that are forested. This data is extensively used for modeling weather and climate, along with applications such as agriculture.

The data plots shown here are generated by averaging all of the data collected by the NOAA AMSU and DMSP SSM/I microwave sensors from 4 different polar-orbiting satellites over a 24 hour period. Blue areas are cool and orange areas are warm.



Details

Category
Land

Audio
No

Dataset Source
NOAA

Dataset Developer
NOAA Visualization Lab

Visualization Developer
NOAA Visualization Lab

Contact
NOAA Visualization Lab

Directory
FTP Link

Keywords
Land, surface temperatures, seasons

Notable Features

- Areas of higher altitude tend to be cooler than surrounding areas
- Land surface temperature is strongly influenced by land use and cover

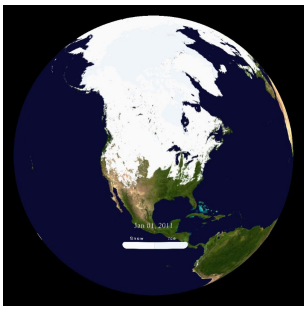
Related Datasets

(None)

Science On a Sphere®
National Oceanic and Atmospheric Administration

Real-time: Snow and Ice Cover

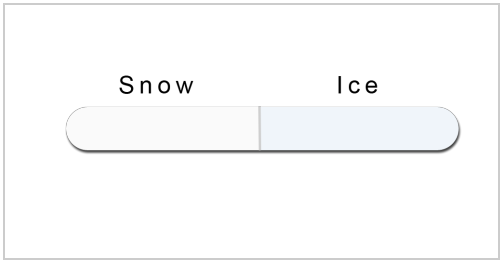
Description



Media Preview

The cryosphere (areas covered by ice, snow, glaciers, or permafrost) is an extremely dynamic part of the global system. Changes in the seasons and climate bring great changes to the extent of Earth's cryosphere. Using satellite data allows scientists to keep a continual eye on these areas.

Infrared and microwave data from multiple satellites including the NOAA's GOES Imager and POES AVHRR, US Air Force DMSP/SSMI, and EUMETSAT MSG/SEVIRI sensors is combined to create these daily maps of global snow and ice cover of the planet. Using multiple datasets provides relatively high spatial resolution (about 4 km/pixel) daily maps in all weather conditions. Light blue areas indicate sea ice extent, whereas white colors indicate all other areas of the cryosphere. This SOS dataset is updated on a daily basis in near real-time.



Details

Category
Ocean

Audio
No

Dataset Source
NOAA, USAF, EUMETSAT

Dataset Developer
NOAA

Visualization Developer
NOAA Visualization Lab

Contact
NOAA Visualization Lab

Directory
FTP Link

Keywords
Ocean, snow, sea ice, real-time

Notable Features

- The seasonal variations are very clear
- During the winter months, the effects of passing snow storms is visible
- In the Northern Hemisphere, the minimum ice concentration occurs in September and the maximum is in March

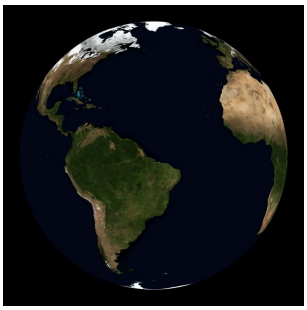
Related Datasets

(None)

Science On a Sphere®
National Oceanic and Atmospheric Administration

Seasonal Blue Marble

Description



Media Preview

The Blue Marble is an incredibly detailed, true-color depiction of the Earth. NASA is responsible for this dataset made from a compilation of satellite images throughout 2001. Most of the information came from NASA's MODIS, the Moderate Resolution Imaging Spectroradiometer, which is attached to the Terra satellite 435 miles above Earth. The background image of the land and oceans was created using data from June through September of 2001. This could not be done in a single day or even a week because on any given day clouds are blocking a significant portion of the surface. The cloud image is a composite of three days worth of data. The first two days of data were collected in the visible wavelength and the third day was needed to get a view of the clouds over the poles using thermal infrared imagery.

The shading is true color with the oceans shades of blue, the clouds white and the lands varying from green to brown. The brown areas are the sands of the deserts. The shading of the land was done using a dataset compiled by the U.S. Geological Survey's Earth Resources Observation and Science Data Center.

Additional Blue Marble datasets are available to highlight some of the characteristics of the changing Earth. The standard Blue Marble is a year long composite to show an average view of the earth. The Blue Marble without clouds is also available in monthly composites the entire year. This monthly evolution is the seasonal blue marble. The monthly evolution allows audiences to see the changing appearance of the Earth due to the season changes. The most dramatic change is the expansion of the snow cover during the winter months and then the depletion of it during the summer months. **Blue Marble: Next Generation** provides an updated version of the seasonal changes dataset. The Blue Marble is also available without the cloud cover so that the vegetation can be clearly seen. This dataset has also been merged with the **Nighttime Lights** dataset, to create a new dataset. The new dataset shows the Earth with daytime and nighttime views of the Earth, to demonstrate how only half of the Earth is illumintated at one time.

Details

Category
Land

Audio
No

Dataset Source
NASA Goddard Space Flight Center

Dataset Developer
NASA Goddard Space Flight Center

Visualization Developer
NASA

Contact
Beth Russell

Directory
FTP Link

Keywords
Land, Solar System, Earth, Blue Marble

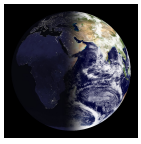
Notable Features

- Vastness of the Sahara Desert
- Shading done in true color: gives Earth's appearance from space

Related Datasets

Blue Marble (23 degree tilt)

Earth with Vegetation

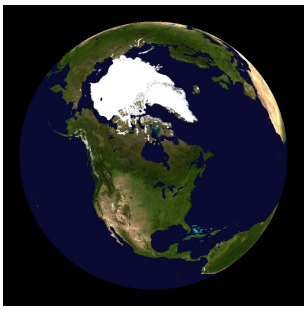


Blue Marble and Nightlights

Science On a Sphere®
National Oceanic and Atmospheric Administration

September Sea Ice Levels from 1987 - 2010

Description



Media Preview

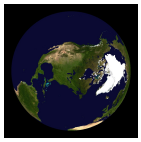
Sea ice is simply ocean water that has frozen. At least 15% of the ocean is covered by sea ice some part of the year. This means that on average, sea ice covers almost 10 million square miles (about 25 million square kilometers) of the Earth. Sea ice concentrations are monitored closely by scientists because changing sea ice concentrations can have a huge impact on the rest of the globe. Global warming is amplified in polar regions. Because of this, monitoring changes in sea ice can be a good indicator of climate change. The National Snow and Ice Data Center monitors sea ice concentrations using a satellite data record that begins in 1978. The Special Sensor Microwave/Imager (SSM/I) is the current monitoring instrument. The sea ice concentration dataset is on a 25km cell size grid covering both Arctic and Antarctic polar regions.

There are three different sea ice concentration datasets available for Science On a Sphere. The first is sea ice concentration every ten days from 1987 - 2010. Sea ice concentration for every six days is available from 2005 - 2007. These datasets show the growth and decay of sea ice concentration throughout the year. In the Arctic, the maximum coverage occurs in March and the minimum coverage occurs in September usually. The opposite is true for Antarctic, where the minimum occurs in March and the maximum occurs in September. An interesting point to note in the long dataset is that the extent of sea ice in the Arctic is shrinking, while the Antarctic sea ice is not trending downward. The third dataset shows only Septembers from 1987 - 2010. September was chosen to highlight the change in the Arctic minimum sea ice concentration through time. The decrease in sea ice coverage is apparent in this dataset.

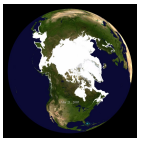
Notable Features

- Seasonal change of sea ice
- Shrinking of Artic sea ice concentration, especially in summers
- The disappearancee of the Odden, a thumb-shaped sea ice feature east of Greenland, which often is visible prior to the late 1990's
- The minimum sea ice concentration in 2007 shattered the previous minimum sea ice record set in 2005 by 23% and contained 39% less ice than the 1979 to 2000 average.

Related Datasets



Weekly Sea Ice July 2005 - August 2007 (over EV)



Weekly Sea Ice from 1987 - 2009 (every 10 days)

Details

Category
Ocean

Audio
No

Dataset Source
National Snow and Ice Data Center

Dataset Developer
Florence Fetterer, Matt Savoie; NSIDC

Visualization Developer
Mike Biere, NOAA/GSD

Contact
Florence Fetterer, Matt Savoie

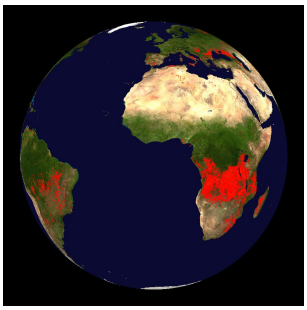
Directory
FTP Link

Keywords
Ocean, sea ice concentration, climate change

Science On a Sphere®
National Oceanic and Atmospheric Administration

Global Fire Maps

Description



Media Preview

In order to monitor the fires occurring globally, a special sensor has been mounted on the Terra and Aqua satellites. The sensor, named the Moderate Resolution Imaging Spectroradiometer (MODIS), is able to provide daily satellite images of the Earth's landmasses in near real-time using the MODIS Rapid Response System. There are many uses for the data collected from MODIS, such as monitoring global fires by detecting the abnormally high temperature anomalies at the surface. When a location is much warmer than the surrounding area, it suggests the presence of a fire or a lava flow. It is important to know the size, location and intensity of fires because of the damage that they can cause, and also to help scientists understand the emissions from the fires and their short- and long-term effects on ecosystems.

The fire maps available for Science On a Sphere® display all of the fires accumulated over 10 day periods. Over the course of a year, 37 maps are generated. (The 37th map includes a few days from the following year.) Every fire that occurred over the 10 day period is indicated by a dot. The dots are colored from red to indicate a low fire count through yellow to indicate a high fire count. The location of widespread fires varies through the year with the seasons. Some of the fires are prescribed fires, which are set to prevent really large uncontrollable fires in the future. In the United States, approximately two million acres are burned in prescribed fires every year, with many more million acres burned in wild fires. The years 2000 and 2007 are available for display.

Notable Features

- Each frame displays the fires accumulated over a 10 day period
- Each dot indicates a fire
- Shading ranges from red for a low fire count to yellow for a high fire count
- Maps are available for 2000 and 2007

Related Datasets

(None)

Details

Category
Land

Audio
No

Dataset Source
MODIS Rapid Response System

Dataset Developer
MODIS Rapid Response System at NASA/GSFC

Visualization Developer
MODIS Rapid Response System at NASA/GSFC

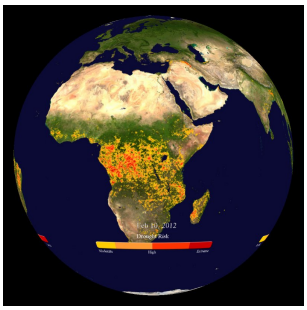
Contact
NASA/GSFC

Directory
FTP Link

Keywords
Fire, satellites, MODIS, Terra, Aqua

Real-time: Drought Risk

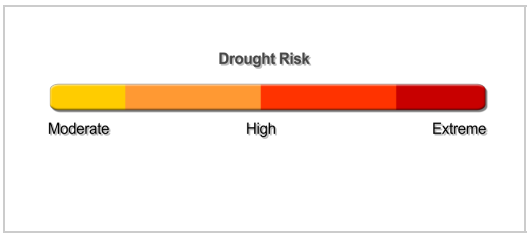
Description



Media Preview

Satellites can detect the difference between rock, grassland, and forests because these surfaces emit energy differently back into space. By measuring these differences and observing the patterns of vegetation --or its lack of growth--NOAA scientists can monitor how droughts are changing across the world through time.

This global drought risk composite is derived from the Normalized Difference Vegetation Index datasets developed by NOAA from measurements of the AVHRR sensor onboard the POES satellite. By monitoring vegetation health, moisture and thermal conditions, scientists are able to identify areas that are considered to be vegetatively stressed due to drought. An important note is that the drought imagery is based solely on the analysis of vegetation health and stress, not soil moisture conditions. But this index serves as a reliable proxy measurement for drought worldwide. Areas of desert and snow cover are not included in the analysis. Yellow areas indicate areas under moderate drought conditions; red indicates areas experiencing extreme drought conditions. A number of other datasets are also being derived from NDVI, including risk indexes for wildfires and malaria. This dataset is updated weekly.



Details

Category
Land

Audio
No

Dataset Source
NOAA

Dataset Developer
NOAA Visualization Lab

Visualization Developer
NOAA Visualization Lab

Contact
NOAA Visualization Lab

Directory
FTP Link

Keywords
Land, drought, seasons

Notable Features

- Location and intensity of drought changes with the seasons
- Drought Risk is updated weekly

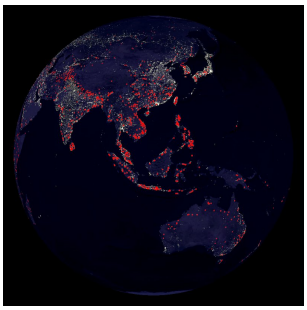
Related Datasets

(None)

Science On a Sphere®
National Oceanic and Atmospheric Administration

Flood Events 2000 - 2009

Description



Media Preview

Flooding is the nation's most common, costly and deadly natural hazard. Heavy rain is the most frequent cause of floods, but there are many other natural triggers, including hurricanes, tidal surges, ice jams and snow melt. Floods and flash floods have happened in all 50 states in the USA. Flooding in river basins is a natural part of the river's processes, serving to improve water quality and provide essential habitat to species, among other benefits. Flooding is a matter of scientific interest, as well as cultural significance, and is critical to land-use planning and policy. It is also a vital concern to the safety and welfare of communities in flood prone areas including those who live along waterways and coasts. People from all walks of life are vulnerable to the effects of flooding.

In this dataset, each orange dot represents a flood from 2000 to 2009 that caused significant damage. The flood events are mapped on top of the night time lights map to give a sense of how many people are affected by flooding. The data was gathered from news, governmental, instrumental, and remote sensing sources by the Dartmouth Flood Observatory at the University of Colorado. The listing is comprehensive and global in scope and all of the events shown are "large flood events with significant damage to structures or agriculture; fatalities; and/or at least 1 to 2 decades long reported interval since the last similar event." For more information on the data source, visit: **http://floodobservatory.colorado.edu/Archives/index.html**

Notable Features

- Each orange dot represents a significant flood event that happened between 2000 and 2009
- Flood data is overlaid on nighttime lights to give a sense of how many people are affected by flooding

Related Datasets

Flood Events - Displaced 250 or More People

Flood Events - 50 or More Fatalities

Flood Events - Due to Heavy Rain

Details

Category
Land

Audio
No

Dataset Source
G.R. Brakenridge, "Global Active Archive of Large Flood Events", Dartmouth Flood Observatory, University of Colorado

Dataset Developer
Lehigh University and Nurture Nature Center

Visualization Developer
Lehigh University and Nurture Nature Center

Contact
Nurture Nature

Directory
FTP Link

Keywords
Land, flooding, disaster, Nurture Nature

Science On a Sphere®
National Oceanic and Atmospheric Administration

Paleo Geographic

Description

Media Preview

These paleo-graphic visualizations are commercial products and are therefore not available from NOAA nor are they included or distributed as part of the Science On a Sphere® system. These visualizations can be purchased from the contacts listed below.

There are two different animations that show the plate tectonics through history. The first is from the ARC Science Center. It is a time-elapsed frame set of approximately 4000 high-resolution images with original artwork visualizing the evolution of the Earth's surface due to plate tectonics over the past 600 million years. The second is from Prof. Chris Scotese, PALEOMAP Project. The PALEOMAP Drift animations show the motions of the continents and the evolution of the ocean basins from the late Precambrian (750 million years ago), through the assembly and breakup of Pangea (250 million years ago), and extends the modern plate motions +250 million years into the future (Pangea Ultima). The whole animation is approximately 8000 frames. Both datasets show the large southern landmass called Pannotia, which began to break apart into several small pieces as well as Gondwana 550 million years ago, which eventually became the cores of North America, Northern Europe, and Siberia. The smaller pieces from the break up of Pannotia drifted together to form Laurasia. Gondwana and Laurasia drifted for more than 200 million years, and then came back together again, pushing up a great mountain range of which the Appalachian Mountains are one remnant.

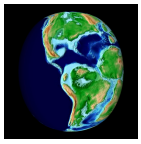
This new super continent, Pangaea, then began its break up around 300 million years ago into what became the present day world. During the Jurassic period, 140-180 million years ago, the North Atlantic opened up, followed by South America and Africa pulling apart to create the South Atlantic, and then the final break up of Gondwana into India, Australia, and Antarctica. When India broke free from other landmasses, it traveled with great speed toward current day Asia. The collision between the two land masses caused the Himalayas to form. Also during this time, several mass extinctions occurred due to various warming and cooling events.

The original 29 frames that were used to created that Arc Science Plate Tectonics Animation are available for public use from Dr. Ron Blakey.

Notable Features

- Both the PALEOMAP and ARC Science animations can be customized to include a marker that travels with the continents indicating the location of a particular museum, city or state through time.
- Appearance of green shading signifying the presence of plant life
- Appalachian Mountains: oldest remnant mountain range to appear
- Pangaea: Major super continent that broke up 300 million years ago
- Break off of India which collides into Asia with great speed causing the formation of the Himalayas and Mount Everest
- Labels indicating the year and the geological period are available

Related Datasets



Scotese Paleo Drift

Paleo Geographic raw frames from Blakey

Details

Category
Land

Audio
No

Dataset Source
Ron Blakey, Department of Geology, Northern Arizona University

Dataset Developer
ARC Science Simulations; Loveland, Colorado

Visualization Developer
ARC Science Simulations; Loveland, Colorado

Contact
Thomas Ligon, ARC Science Simulations, 970-667-1168

Directory
FTP Link

Keywords
Land, Models and Simulations, paleontology, plate tectonics

Science On a Sphere®
National Oceanic and Atmospheric Administration

ETOPO2: Earth Topography and Bathymetry

Description

Media Preview

Many datasets have been created by utilizing the ETOPO2 dataset, which was generated from digital data bases of seafloor and land elevations on a 2-minute latitude/longitude grid (1 minute of latitude = 1 nautical mile, or 1.15 statute mile). The ETOPO2 is a combination of satellite altimetry observations, shipboard echo-sounding measurements, data from the Digital Bathymetric Data Base Variable Resolution and data from the GLOBE project which has a global digital elevation model. The topography and bathymetry side of the Hot Topo dataset was created with this digital data base, as well as the datasets EarthLiteColor, EarthOne, and Earth Land/Bathymetry. EarthOne and Earth Land/Bathymetry are shaded in relatively true color, while Hot Topo and EarthLiteColor use green, yellow, orange, red and white to denote increasing elevation of the land.

All of these datasets show the intricate topography and bathymetry of the Earth. The Himalayas in Asia, which are home to Mount Everest, the tallest point on Earth at 29,035 feet, are clearly visible. Other significant mountain ranges that are easily detected are the Andes in South America, the Rocky Mountains in North America, and the Alps in Europe. The longest mountain range in the world, the global mid-oceanic ridge system, can be found on the ocean floors and runs for approximately 37,000 miles. All of the mid-ocean ridges of the world can be regarded as a continuous oceanic ridge system. The Mid-Atlantic Ridge, which cuts through the Atlantic Ocean, has peaks that break the waters surface to form islands. The ridge joins the Indian Ridge which is to the east of Africa. All of these ridges are the result of plate tectonics. The plates in the Atlantic Ocean are slowly drifting apart causing the Atlantic Ocean to widen at a rate of 5 - 10 cm per year. Other notable features on the seafloor are the impressive trenches that have formed where one tectonic plate dives beneath another. The Marianas Trench between Japan and Australia is the deepest spot in the world's oceans with a depth of 36,201 feet. The deepest part of the Atlantic Ocean is in the Puerto Rico Trench, off the coast of Puerto Rico. It has recorded depths of 28,232 feet.

Details

Category
Land

Audio
No

Dataset Source
Smith and Sandwell (1997); GLOBE; DBDBV

Dataset Developer
NOAA; NGDC ETOPO-2

Visualization Developer
NOAA; NGDC ETOPO-2

Contact
Beth Russell

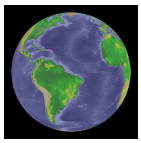
Directory
FTP Link

Keywords
Land, ETOPO2, bathymetry, topography

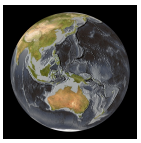
Notable Features

- Mount Everest: tallest point on Earth at 29,035 ft
- Marianas Trench: deepest point on Earth at 36,201 ft
- Mountain Ranges: Himalayas, Rockies, Andes, Alps
- Global mid-oceanic ridge system: longest mountain range

Related Datasets



ETOPO2: Earth Color Enhanced

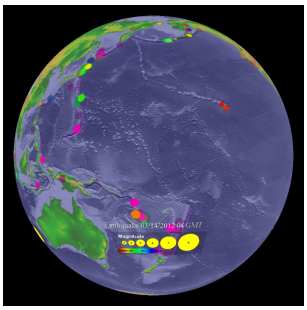


ETOPO2: Earth One Shaded

Science On a Sphere®
National Oceanic and Atmospheric Administration

Real-time: Earthquake Hi-res Animation (2K - with legend)

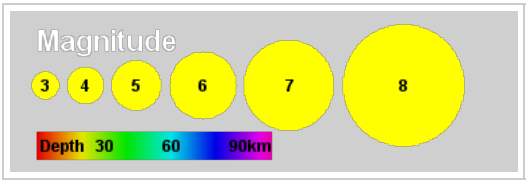
Description



Media Preview

Earthquakes occur naturally everyday. Anything that causes seismic waves to radiate throughout the Earth is an earthquake. There are two main types of earthquakes, tectonic and anthropogenic (caused by humans). Tectonic earthquakes are naturally occurring and are caused by earth movement. The surface of the Earth is composed of a mosaic of tectonic plates moving with respect to each other. When two plates glide past one another, a stress builds up at the boundary. When that stress reaches a critical level, the boundary slips and the result is an earthquake. The traces of repeated slips are known as fault lines. Anthropogenic earthquakes can be caused by drilling for fossil fuels, extraction of minerals, huge explosions, and the collapse of large buildings.

Most earthquakes are small enough to hardly be noticed; however, some can be very powerful causing widespread death and destruction and can even trigger tsunamis. The Richter magnitude scale was created to rate the strength and magnitude of earthquakes. It is a base-10 logarithm scale of ground motion 100km from the epicenter. Each increase of 1 magnitude means 10 times greater ground motion. To measure the amount of energy that was released during an Earthquake, a base 32 logarithm scale is used. This real-time dataset shows the earthquakes that daily happen around the world that are greater than 2.5 on the Richter scale. With the current database from the USGS, many earthquakes outside of the United States under 4-5 magnitude on the Richter scale are not reported. The size of the circle is proportional to the magnitude of the earthquake, with bigger values on the Richter scale represented by bigger circles. The coloring of the circles is based on the depth of the earthquake below the surface according to the provided color bar. After an earthquake occurs, the representing circle fades out over a seven day period. This dataset is updated hourly.



Details

Category
Land

Audio
No

Dataset Source
United States Geological Survey

Dataset Developer
Steve Albers, NOAA/GSD

Visualization Developer
Steve Albers, NOAA/GSD

Contact
Steve Albers

Directory
FTP Link

Keywords
Land, earthquake, plate tectonics, real-time

Notable Features

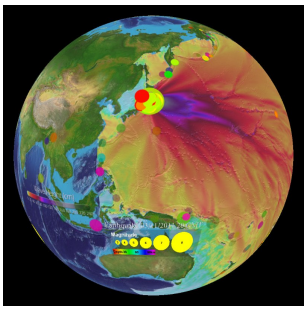
- Circles indicate earthquake; size indicates magnitude, color indicates depth
- Majority of earthquakes along plate boundaries

Related Datasets

(None)

Japan Earthquake and Tsunami Wave Heights Merged

Description



Media Preview

On March 11, 2011 at 2:45 local time, a 9.0 magnitude earthquake occurred 81 miles (130 km) off the east coast of Sendai, Japan, triggering a massive tsunami. It is estimated that the initial tsunami wave took 10 to 30 minutes to make its first landfall. Forecasted wave heights were up to 33 ft (10 m) and there were many reports of tsunami waves three stories high in parts of Japan. Across the Pacific Ocean, many countries issued evacuations along the coasts because of the predicted tsunami waves.

There are several datasets related to this event. The first is a model run of predicted tsunami wave heights from the Center for Tsunami Research at the NOAA Pacific Marine Environmental Laboratory. It shows the predicted wave heights of the tsunami as it travels across the Pacific basin. The largest wave heights are near the earthquake epicenter, off Japan. The wave decreases in height as it travels across the deep Pacific but grows taller as it encounters shallow waters near coastal areas. In general, the energy of the wave decreases with distance, causing the maximum height of the waves at the coasts to decrease. This explains why coastal Hawaii does not see the heights that were encountered in coastal Japan. Out in the open ocean, areas of low wave height correspond to deeper areas in the ocean.

To show the earthquake activity, a snapshot of the Real-Time Earthquake dataset has been archived. This loop, which is composed of hourly images, starts on February 19, 2011 and runs through March 24, 2011. Increased activity near Japan can be seen in the days before March 11. After the event, hundreds of powerful aftershocks, occurred for days. Over thirty of the aftershocks had a magnitude of greater than 6. In addition, a third dataset has been created by merging the earthquake activity with the predicted tsunami wave heights.

Details

Category
Land

Audio
No

Dataset Source
United States Geological Survey

Dataset Developer
NASA GSFC

Visualization Developer
Steve Albers, NOAA/GSD, NASA GSFC

Contact
Steve Albers

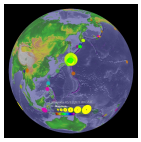
Directory
FTP Link

Keywords
Ocean, Tsunami, PMEL, Japan, Earthquake

Notable Features

- The earthquake had a magnitude of 9.0 and was followed by over thirty aftershocks with a magnitude of over 6.0
- The predicted wave heights are the height of the waves in the open ocean

Related Datasets

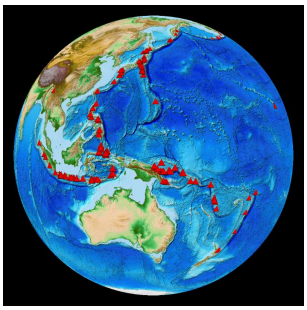


Japan Earthquake

Science On a Sphere®
National Oceanic and Atmospheric Administration

Volcano Eruptions

Description



Media Preview

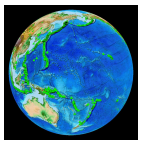
According to the **Smithsonian Institute's Global Volcanism Program**, there are probably about 20 volcanoes erupting right now, and about 550 volcanoes have had historically documented eruptions. A volcano is an opening, or rupture, in the Earth's crust through which molten lava, ash, and gases are ejected. Volcanoes typically form in three different settings. The first is divergent plate boundaries, where tectonic plates are pulling apart from one another, such as the Mid-Atlantic Ocean Ridge. Most of these volcanoes are on the bottom of the ocean floor and are responsible for creating new sea floor. The second location is convergent plate boundaries, where two plates, typically an oceanic and continental plate, are colliding. The volcanoes along the Pacific Ring of Fire are from convergent plate boundaries. The third location is over hotspots, which are typically in the middle of tectonic plates and caused by hot magma rising to the surface. The volcanoes on Hawaii are the result of hotspots.

There are three datasets for Science On a Sphere that highlight global volcano locations. The first dataset, compiled by the **Smithsonian Institute's Global Volcanism Program**, shows the locations of current and past activity for all volcanoes on the planet active during the last 10,000 years. The other two datasets are from the **National Geophysical Data Center's Significant Volcanic Eruption Database**. One shows the locations of significant eruptions, of which there are over 400. An eruption if considered significant if there are any fatalities linked to it, the cost of the damage is over one million dollar, it causes a tsunami or there is a major earthquake associated with it. The final dataset shows the locations of all eruptions that have caused tsunami.

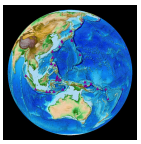
Notable Features

- Most volcanoes occur along convergent boundaries
- There have been about 1300 know eruptions in the last 10,000 years
- There have been over 400 significant eruptions
- There have been 110 eruptions that caused tsunamis

Related Datasets



Volcano Locations Globally



Volcano Eruptions causing Tsunamis

Details

Category
Land

Audio
No

Dataset Source
National Geophysical Data Center's Significant Volcanic Eruption Database

Dataset Developer
National Geophysical Data Center's Significant Volcanic Eruption Database

Visualization Developer
Barry Eakins, NOAA NGDC

Contact
Beth Russell

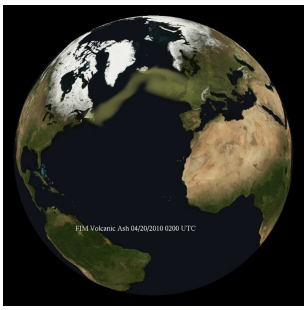
Directory
FTP Link

Keywords
Land, satellite, water, anomaly, climate change

Science On a Sphere®
National Oceanic and Atmospheric Administration

Volcanic Ash - FIM Chem Forecast Model

Description



Media Preview

Eyjafjallajokull, a glacier covered volcano in southern Iceland, erupted explosively on April 14, 2010. The name Eyjafjallajokull is Icelandic for "island-mountain glacier." The volcano initially erupted on March 20, but this original eruption was much smaller and only caused a brief evacuation of the local area. The April 14 event was 10 to 20 times more powerful and had international impacts. Locally, the eruption and resulting lava melted the surrounding glacier, causing major flooding. Internationally, air traffic was impacted for several days following the eruption. The volcano ejected ash over 30,000ft into the atmosphere, causing significant disruptions to the European and Trans-Atlantic air travel. Airspace over much of northern Europe was closed from April 15 through April 23 for concerns over the abrasive volcanic ash causing engine failures.

The last time Eyjafjallajokull erupted in 1821, it spewed ash for over a year. The London Volcanic Ash Advisory Commission determined that the 2010 eruption stopped on May 23, 2010. Volcanologists consider a volcano to once again be dormant when all activity ceases for three months. This dataset was created with the FIM-Chem-Ash forecasting model, a global model developed by NOAA that forecasts 17 aerosol concentrations, including volcanic ash. In this dataset, only volcanic ash is included. The forecast starts April 15, the day after the eruption and runs for one week, through April 22. The effect of the weather patterns on the ash dispersion is readily apparent in this animation, as the ash cloud changes shapes and moves different directions. The transparency of the color is set on a logarithmic scale to the concentration of the ash.

Notable Features

- This animation is a volcanic ash forecast model that starts on April 15 and runs out for one week, through April 22
- The weather impacts the movement of the ash cloud
- The transparency of the color is set on a logarithmic scale to the concentration of the ash

Related Datasets

(None)

Details

Category
Atmosphere

Audio
No

Dataset Source
NOAA FIM-Chem-Ash Model

Dataset Developer
NOAA FIM-Chem-Ash Model

Visualization Developer
Steve Albers, NOAA/GSD

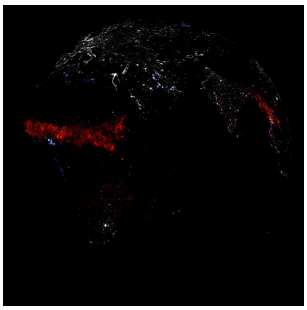
Contact
Georg Grell

Directory
FTP Link

Keywords
Atmosphere, volcano, ash, FIM, model

Colored Night Lights

Description



Media Preview

This visualization uses the same database as the nighttime side of the **Hot Topo** visualization. The data was recorded by the Defense Meteorological Satellite Program, DMSP, in the National Geophysical Data Center. The Earth Observation Group in the NGDC maintains the archived data, performs research on the data, and makes products utilizing the data available. The data was collected using polar orbiting satellites that provide full cover of the globe twice a day. The satellites have an Operation Linescan system which allows them to detect low levels of visible-near infrared radiance at night. With this data, it is possible to detect clouds illuminated by moonlight, lights from cities and towns, industrial sites, gas flares, fires, lightning, and aurora. The Nighttime Lights of the World data set was complied from DMSP data spanning October 1994 - March 1995.

This particular visualization shows only the lights generated from electricity. The oceans are shaded a very dark blue and the land is shaded a slightly lighter blue so that they can be distinguished. All of the lights are bright white. Areas of high economic prosperity and/or population are generally the areas that are well illuminated. Most of the coast lines are well highlighted, as it seems people like to live by the water. The Nile River in Africa it outlined by the lights that border it. In the United States, it is visible that the eastern half of the country is more densely populated than most other areas. Major highways can be identified by the lights along them.

Special colorized versions of these maps can also be used to detect power outages. This is done by comparing an annual composite image against data from one night. The lights in the composite image are shaded red, the visible data from the one night is shaded green and the thermal data from the one night is shaded blue. The result is clouds show up blue, lights that are on during both time periods show up yellow, lights that were on only on the single night show up green and lights that were on in the composite image, but not the one night show up red. Any widespread area that is red suggests a power outage. Two images from August 30, 2005, right after Hurricane Katrina hit, are available to display on the sphere as a picture in a picture. The first is a black and white image of the lights from August 30 and the second is the same image, but colorized to highlight the widespread power outages.

There are three additional variations of the nighttime lights map. The first dataset is the nighttime lights merged with the **Blue Marble** dataset. The new dataset shows the Earth with daytime and nighttime views of the Earth, to demonstrate how only half of the Earth is illumintated at one time. The second dataset is similar to the original nighttime lights dataset, but the lights have been colorized based on the light source. The white represents lights generated from electricity, the red shading shows fires, the pink shading indicates light from squid fishing boats, and the blue spots are gas flares from oil rigs. The third variation is two maps, one with electric lights from 1992, the second with electric lights from 2002. By comparing the two images, viewers can see areas of growth and decline.

There are also additional updates to this dataset. The first is a color composite of three years - 1992, 2000, 2008 - of DMSP nighttime lights. Each year has been assigned to one of the primary colors: 1992 = blue, 2000 = green, 2008 = red. The contrast has been enhanced to show all the detected lights, including the dim lighting often detected in populated rural areas. Locations that had bright lighting in all three years are white. There are many rural areas in India and elsewhere that have a bronze color, indicating that they had no detected lighting in 1992 and dim lighting detected in both 2000 and 2008. Notice the areas of blue lighting in several parts of the Former Soviet Union, the result of collapse and loss of lighting in the mid-1990's. The second is similar, but only compares two years - 1992 and 2009 - of DMSP nighttime lights. In this dataset, purple represents a decrease in light levels, white represents no change in light levels and yellow represents an increase in light levels. Both of these datasets are available with and without country borders. For more information about the comparision dataset, visit **here**.

Notable Features

- Nile River outlined by lights
- Eastern U.S. highly populated
- Major highways outlined by lights

Related Datasets

Details

Category
Land

Audio
No

Dataset Source
DMSP

Dataset Developer
NOAA NGDC Earth Observations Group

Visualization Developer
NOAA NGDC Earth Observations Group

Contact
Beth Russell

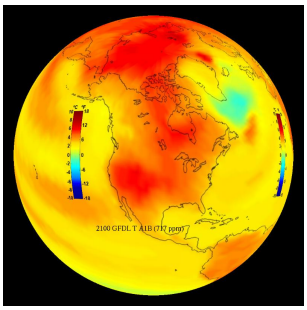
Directory
FTP Link

Keywords
Land, nighttime lights, DMSP, NGDC

Science On a Sphere®
National Oceanic and Atmospheric Administration

GFDL a1b Temp Change 1870-2100

Description



Media Preview

"The Intergovernmental Panel on Climate Change (IPCC) was established by WMO and UNEP to assess scientific, technical and socio- economic information relevant for the understanding of climate change, its potential impacts and options for adaptation and mitigation. It is open to all members of the UN and of WMO." - **from www.ipcc.ch** In an effort to better visualize the future of climate change, the IPCC releases assessment reports on the current state of the atmosphere and what the future could hold. Models from various atmospheric and oceanic organizations are included in these reports in order to establish a broad understanding of the science. Data from three of the IPCC models following temperature change from 1870 - 2100 have been formatted for Science On a Sphere®.

The models available on SOS are the **Climate Model 2.1, developed by the Geophysical Fluid Dynamics Laboratory;** the Community Climate System Model 3.0, developed by the National Center for Atmospheric Research; and the Hadley Centre HadCM3, developed by the United Kingdom Meteorology Office. All three models have similar forcing agents. For the past data they use the 20th Century Model 20C3M, which takes into account the historical record of greenhouse gases, sulfate aerosol concentrations, volcanic aerosol optical depths, and historical solar irradiation. For the future, there are two variations. Each model is available using the Special Report on Emissions Scenarios, SRES, A1B scenario, which assumes:

- Rapid economic growth
- A global population that reaches 9 billion in 2050 and then gradually declines.
- The quick spread of new and efficient technologies.
- A convergent world - income and way of life converge between regions. Extensive social and cultural interactions worldwide.
- A balanced emphasis on all energy sources

In addition, each model is also available using the more ecologically friendly SRES B1 scenario, which assumes:

- Rapid economic growth as in A1, but with rapid changes towards a service and information economy.
- Population rising to 9 billion in 2050 and then declining as in A1.
- Reductions in material intensity and the introduction of clean and resource efficient technologies.
- An emphasis on global solutions to economic, social and environmental stability.

Even though the all the models use the same inputs, the results vary because each of the three models have differing dynamics and physics parameterizations. In all of the models for the A1B scenario, CO2 production increases until it reaches 717ppm in the year 2100. For the B1 scenario, CO2 production increases until it reaches 621 ppm in the year 2100. The temperatures displayed in the datasets are all a comparison to temperatures in 2000. Blue tones on the visualization represent temperatures cooler than those in 2000, while red tones represent temperatures warmer than those in 2000.

In addition to the six model runs, there is a also a dataset has frames from the A1B and B1 scenario as modeled by GFDL for 2025, 2050, 2075, and 2100 in order to compare and contrast the differences between the two scenarios.

Notable Features

Model and Scenario	Global Mean Warming	North America Mean Warming
GFDL B1	2.7F (1.5C)	4.32F (2.4C)
GFDL A1B	5.22F (2.9C)	8.82F (4.9C)
CCSM B1	2.52F (1.4C)	3.24F (1.8C)
CCSM A1B	4.86F (2.7C)	7.56F (4.2C)
HAD B1	3.42F (1.9C)	5.4F (3.0C)
HAD A1B	6.66F (3.7C)	10.26F (5.7C)

Note: Global Mean Warming and North America Mean Warming are the difference between decadal averages for 1990-2000 and 2090-2100.

Details

Category
Models/Simulations

Audio
No

Dataset Source
Geophysical Fluid Dynamics Laboratory

Dataset Developer
Geophysical Fluid Dynamics Laboratory

Visualization Developer
Nikki Prive, NOAA/GSD

Contact
Dan Pisut, NOAA/NESDIS

Directory
FTP Link

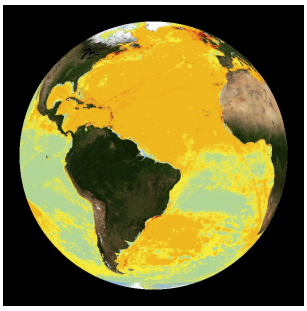
KML
KML File

Keywords
Models and Simulations, CO2, global warming, temperature, GFDL, NCAR, UKMET

Science On a Sphere®
National Oceanic and Atmospheric Administration

Extent of Harmful Human Influences on Global Marine Ecosystems

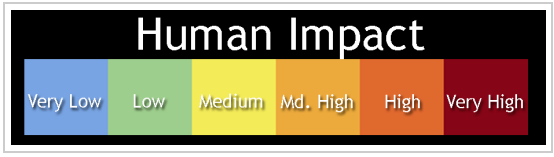
Description



Media Preview

The ocean has an impact on the lives of everyone on Earth, even those who don't live on the coasts. It has been estimated that one in every six jobs in the United States is marine-related and that 50% of all species on Earth are supported by the ocean. Because of this, it is important to protect and preserve the oceans. Humans however have been shown to have a negative impact on the oceans. A report issued in February 2008 found that 40% of the world's oceans are heavily impacted by human activities, such as overfishing and pollution. In all 17 different human activities were examined in the report, including fertilizer run-off, commercial shipping, and indirect activities such as changes in sea surface temperature, UV radiation, and ocean acidification.

This dataset is a map that was put together from the data compiled from the report, A Global Map of Human Impact on Marine Ecosystems, which was published in Science Magazine (**see full text**). In addition to finding that 40% of the world's oceans are heavily impacted by human activities, researchers also concluded that no area is unaffected by human influence. However, there are large areas that have relatively low human impact, especially near the poles. The areas where humans have had the worst impact include the East Cost of North America, North Sea, South and East China Seas, Caribbean Sea, Mediterranean Sea, Red Sea, Persian Gulf, Bering Sea and the western Pacific Ocean. Areas that are shaded red have a high human impact and blue areas have a very low human impact. The study also examined 20 marine ecosystems to determine the impact of the human influences. The ecosystems that are most threatened are coral reefs, seagrass beds, and mangroves.



NOAA press release

Notable Features

- 40% of the world's oceans are heavily impacted by human activities
- The areas with the least impact are near the poles

Related Datasets

(None)

Details

Category
Ocean

Audio
No

Dataset Source
Benjamin S. Halpern, Shaun Walbridge, Kimberly A. Selkoe, Carrie V. Kappel, Fiorenza Micheli, Caterina D'Agrosa, John F. Bruno, Kenneth S. Casey, Colin Ebert, Helen E. Fox, Rod Fujita, Dennis Heinemann, Hunter S. Lenihan, Elizabeth M.P. Madin, Matthew T.

Dataset Developer
NOAA Environmental Visualization Program

Visualization Developer
NOAA Environmental Visualization Program

Contact
Beth Russell

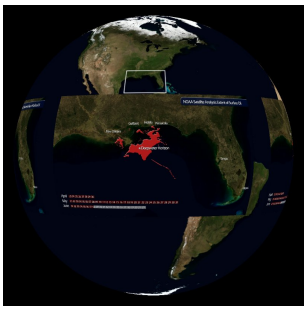
Directory
FTP Link

Keywords
Ocean, ecosystems, pollution, human impacts

Science On a Sphere®
National Oceanic and Atmospheric Administration

Deepwater Horizons Oil Spill August 2

Description



Media Preview

Oil started gushing into the Gulf of Mexico after the BP Deepwater Horizon caught fire on April 20th, 2010, exploded, and sank. The leaking well was finally capped on July 15, 2010. The subsequent oil loss threatens the health of the Gulf and coastal ecosystems in the region. Starting April 23rd, NOAA's Satellite Analysis Branch used data from a variety of high resolution visible and synthetic aperture radar satellites from NOAA's partners in Earth observations to document the extent of the surface oil. Satellite data used in this daily analysis includes NASA's Aqua and Terra MODIS, Canadian Space Agency's RADARSAT-1 and -2 SAR, Italian Space Agency's COSMO-SkyMed, German Aerospace Centr's TerraSAR-X, JAXA's ALOS, Satellite Imaging Corporation's SPOT-5, multispectral imagery from The Disaster Monitoring Constellation, and European Space Agency's ENVISAT SAR.

This animation, used a picture in picture (pip) on SOS, shows the daily change in the satellite analysis of surface oil extents. The background map highlights the area of detail shown in the pip. It should be noted that the observed extents may in some cases not reflect the actual extents due to the difficultly in identifying oil slicks from space. For instance, medium resolution visible images are taken using sunglint data, whereby the sun's angle creates a glare off the surface of the ocean. If the glare is not wide enough, not all of the plume will be seen. Oil-like sheens from algal blooms also complicate the matter. Very high resolution visible and synthetic aperture radar satellites also have very narrow swath coverage, so a large plume or patches of oil may extend past the bounds of the sensor's detection area. For all of these reasons, the analysts at NOAA's Satellite Analysis Branch must use all of the data available to generate a composite over a 24 hour period. Some days, not enough data was available to generate an accurate extent estimate, so those dates are missing from this time series. In addition, these extents show only the surface oil, not the subsurface plumes. This dataset is runs through August 2, two weeks after the leaking well capped.

From the NOAA Environmental Visualization Laboratory **website.**

Notable Features

- Oil extent is measured by satellites and might not portray the actual extent of the oil
- This dataset only shows surface oil, not subsurface plumes

Related Datasets

(None)

Details

Category
Ocean

Audio
No

Dataset Source
NOAA Environmental Visualization Laboratory

Dataset Developer
NOAA Environmental Visualization Laboratory

Visualization Developer
NOAA Environmental Visualization Laboratory

Contact
NOAA Environmental Visualization Laboratory

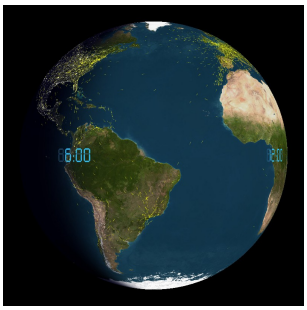
Directory
FTP Link

Keywords
Ocean, oil spill, Gulf of Mexico, Deepwater Horizon

Science On a Sphere®
National Oceanic and Atmospheric Administration

Air Traffic with Day/Night Terminator

Description



Media Preview

"On any given day, more than 87,000 flights are in the skies in the United States. Only one-third are commercial carriers, like American, United or Southwest. On an average day, air traffic controllers handle 28,537 commercial flights (major and regional airlines), 27,178 general aviation flights (private planes), 24,548 air taxi flights (planes for hire), 5,260 military flights and 2,148 air cargo flights (Federal Express, UPS, etc.). At any given moment, roughly 5,000 planes are in the skies above the United States. In one year, controllers handle an average of 64 million takeoffs and landings." - From the National Air Traffic Controllers Association **webpage**

This dataset tracks commercial flights from the approximately 9000 civil airports worldwide. The day/night terminator is included as a time reference. Flight traffic picks up noticeably during daylight hours and drops off through the night. Each yellow tail is one plane in this visualization

Notable Features

- Each yellow tail is one plane
- Flight traffic increases through the daylight hours

Related Datasets

(None)

Details

Category
Atmosphere

Audio
No

Dataset Source
flightstats.com

Dataset Developer
Thomas Ruosch, Dr. Karl Rege; Institute of Applied Information Technology, Zurich University of Applied Science

Visualization Developer
Thomas Hofer, Technorama - The Swiss Science Center

Contact
Thomas Hofer

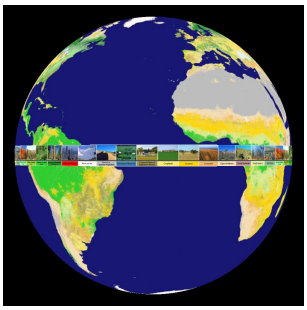
Directory
FTP Link

Keywords
Air traffic, air planes, day/night terminator

Science On a Sphere®
National Oceanic and Atmospheric Administration

Land Cover Map with Ribbon of Labels

Description



Media Preview

The Moderate Resolution Imaging Spectroradiometer (MODIS) instrument on NASA's Terra satellite provides scientists with a new view of the Earth. Using data collected by MODIS, researchers at Boston University were able to create these land cover maps. Understanding the land cover of Earth aids policy makers involved in natural resource management. The maps are also critical for scientists as they study changes in the Earth system and as they model the Earth system. For example, in order to calculate the carbon budget for the Earth system, scientists can use these maps to determine the extent of vegetation covering the land surface that is absorbing carbon dioxide. Each of the varying land types have different impacts on the Earth system. Snow and ice cover cool the planet by reflecting sunlight back to space, forests absorb huge amounts of carbon dioxide, and croplands and urban areas reflect the human impact on the Earth.

The data that was analyzed for this map was collected by MODIS from November 2000 through October 2001. This map is the most refined global picture ever created of the distribution of Earth's ecosystems and land use patterns. The spatial resolution of this land cover map is 1 kilometer (.6 miles), a noted improvement on older versions of similar maps. The map is color coded based on 16 different land cover types. The land cover types fall into one of two categories, natural vegetation and agricultural, urban, and barren. There are eleven natural vegetation land types, ranging from Evergreen Needleleaf Forests to Permanent Wetland. The remaining five land types vary from croplands to snow and ice to urban and built-up. There are three versions of this dataset. Two show the same map base map, but have different label styles. One shows all of the labels in a ribbon around the equator and the other has a slide show of each land type. The third version shows each of the categories separately then progressively overlays the layers.

Classification	Percentage of Global Surface Coverage	Percentage of Land Surface Coverage
Permanent Snow and Ice	11.46%	33.79%
Open Shrublands	5.57%	16.42%
Barren/Sparsely Vegetated	3.22%	9.50%
Grasslands	2.27%	6.70%
Croplands	2.19%	6.45%
Evergreen Broadleaf	1.92%	5.66%
Woody Savannas	1.83%	5.40%
Savannas	1.38%	4.08%
Mixed Forests	1.33%	3.93%
Evergreen Needleleaf	1.31%	3.86%
Cropland/Natural Vegetation	0.49%	1.43%
Deciduous Broadleaf	0.36%	1.05%
Deciduous Needleleaf	0.23%	0.68%
Urban and Built-up	0.12%	0.36%
Closed Shrublands	0.12%	0.35%
Missing Data	0.06%	0.18%
Permanent Wetlands	0.06%	0.17%
Water	66.08%	--

Notable Features

- There are 16 different land types used in this dataset
- The spatial resolution is 1 kilometer (.6 miles)

Related Datasets

Details

Category
Land

Audio
No

Dataset Source
NASA MODIS

Dataset Developer
Boston University

Visualization Developer
Boston University, NASA

Contact
Beth Russell

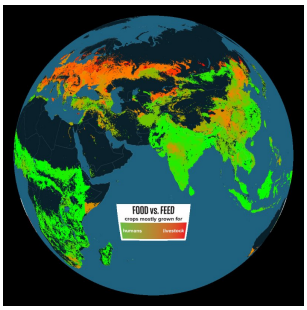
Directory
FTP Link

Keywords
Land, satellite, MODIS, cover, vegetation

Science On a Sphere®
National Oceanic and Atmospheric Administration

Food vs. Feed

Description



Media Preview

Not all cropland is used for producing food directly for people. A lot of the food crops grown are actually used as feed for animals. This map shows which regions produce crops that are mostly consumed directly by humans (in green), which regions produce about the same amount of human food and animal feed (in orange), and where most of the crops are used as animal feed (in red).

As discussed in **2 Billion More Coming to Dinner**, the conversion of crops to meat is not particularly efficient (in the case of cattle, for example, about 30 pounds of feed are needed to grow a single pound of beef), so as global demand for meat rises, cropland devoted to growing animal feed will have to increase proportionately. What effect will this have on the cost of meat, crops, and our diets?

Notable Features

- Green - crops consumed mostly by humans
- Orange - crops consumed equally by humans and animals
- Red - crops consumed mostly by animals

Related Datasets

(None)

Details

Category
Land

Audio
No

Dataset Source
University of Minnesota/Institute on the Environment/Global Landscapes Initiative

Dataset Developer
University of Minnesota/Institute on the Environment/Global Landscapes Initiative

Visualization Developer
University of Minnesota/Institute on the Environment/Global Landscapes Initiative, Science Museum of Minnesota

Contact
Science Museum of Minnesota

Directory
FTP Link

Keywords
Land, cropland, pastureland, animals, meat, food

Science On a Sphere®
National Oceanic and Atmospheric Administration

Facebook Friendships

Description

Media Preview

This dataset was created by an intern at Facebook who plotted 10 million pairs of friends on Facebook. The result is a stunning map that shows the connections between people and highlights the regions with readily available access to the internet. Africa, with limited internet access is rather dim, while China, with many internet users is dim due to the use of a popular Chinese social networking site and government restrictions.

From the creator upon refining the visualization - "After a few minutes of rendering, the new plot appeared, and I was a bit taken aback by what I saw. The blob had turned into a surprisingly detailed map of the world. Not only were continents visible, certain international borders were apparent as well. What really struck me, though, was knowing that the lines didn't represent coasts or rivers or political borders, but real human relationships. Each line might represent a friendship made while traveling, a family member abroad, or an old college friend pulled away by the various forces of life."

For more information on the creation of this dataset, visit **here**

Related Datasets

(None)

Details

Category
Extras

Audio
No

Dataset Source
Facebook

Dataset Developer
Facebook

Visualization Developer
Facebook

Contact
Facebook

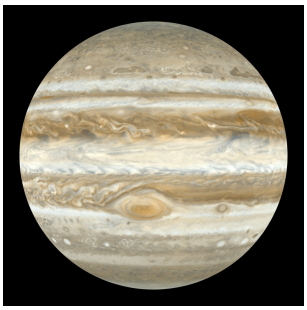
Directory
FTP Link

Keywords
extras, Facebook, Friendships

Science On a Sphere®
National Oceanic and Atmospheric Administration

Jupiter (movie)

Description



Media Preview

The fifth planet in the solar system, Jupiter is the first of the gas planets. It is the largest planet in the solar system with an impressive radius of 44,423 miles, more than 11 times that of Earth, and about one-tenth that of the sun. Because Jupiter is a gas planet, it does not have a solid surface, the gases simply become denser closer to the center, eventually turning into a liquid. Because this planet is not a solid, it easily distorts. In fact, Jupiter, which has the fastest rotation rate in the solar system, bulges at the equator and flattens at the poles due to its rapid rotation. Jupiter's composition is estimated to be 90% hydrogen and 10% helium with a couple of other trace gases as well. What can be seen from space are the ammonia clouds that surround the planet. The visible bands of color are the result of very high velocity winds that flow in opposite directions in adjacent bands. Within these bands are storms that have raged on for years. The most notable is the Great Red Spot, a storm that has been observed for 300 years. Three Earth's could easily fit into the Great Red Spot.

Jupiter has been described as its own little solar system because of the vast number of moons orbiting the planet. There are 63 moons around Jupiter, the most of any planet in the solar system. Four in particular, Io, Europa, Ganymede, and Callisto, are planet sized. In 2003 alone, 23 new moons were discovered. Reasons for this incredible number of moons include the strong gravitational force of the planet at 20.87 m/s2, more than double the gravitational force on Earth, and also the large magnetic field of the planet, which extends into Saturn's orbit. Like Saturn, Jupiter also has rings, though they are only visible when backlit by the sun and believed to be comprised of dust kicked up from meteor collisions with the four biggest moons.

Several new Jupiter datasets have come from both the Hubble Space Telescope and the New Horizons spacecraft. The New Horizons spacecraft was launched in January of 2006 with the goal of studying Pluto in 2015. On its way to Pluto, New Horizons has provided pictures of other planets as well. The black and white animation of Jupiter that is available for SOS is made of images from New Horizons spacecraft that have been overlaid on a Hubble Space Telescope image from 2007. The Hubble Space Telescope datasets include surface pictures from February and March of 2007 that show the Great Red Spot and the Red Spot Junior, a sequence of images that show the different layers of Jupiter's atmosphere by varying the spectrum, and a view of Jupiter after it was hit by a comet.

Details

Category
Astronomy

Audio
No

Dataset Source
Cassini

Dataset Developer
Cassini Imaging Team

Visualization Developer
Steve Albers NOAA/GSD

Contact

Directory
FTP Link

Keywords
Solar System, planet, biggest

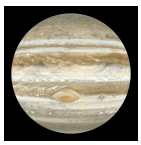
Notable Features

- Great Red Spot — storm on surface observed for 300 years
  - It moves East/West but never North/South
- Bands of color created by the high winds in opposite directions

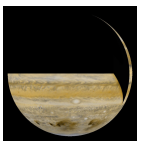
Hubble Space Telescope and New Horizons Datasets

- The Red Spot Junior is visible

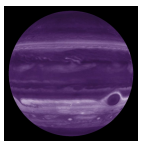
Related Datasets



Jupiter (still)



Jupiter Shoemaker-Levy Comet Collision

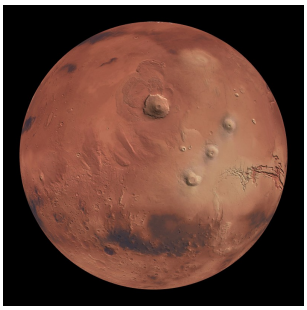


Jupiter HST sequence 2007

Science On a Sphere®
National Oceanic and Atmospheric Administration

Red Mars (25 degree tilt)

Description



Media Preview

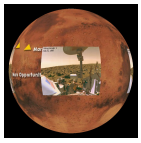
Mars is aptly referred to as the red planet as its surface is red due to a high concentration of iron oxides in the soil. Often the center of science fiction stories, Mars once was believed to support intelligent creatures. Missions to Mars in 1965 and again in 1976 proved that there were no living organisms on Mars. However, this small rocky planet, the fourth from the sun, does have polar ice caps that change in size with the seasons. It is believed that 3.5 billion years ago the most significant floods in the solar system took place on Mars. The Mars Odyssey found large amounts of ice about 1 meter below the surface of Mars in 2002. This ice, thought to be from the floods, would fill Lake Michigan over two times. This is still not enough water to explain the erosion visible on Mars.

Mars touts not only the highest point in the solar system, but also a canyon over 4 miles (6.5 km) deep. The highest point, the mountain Olympus Mons is 88,500 feet (almost 17 miles) above the surrounding area and has an astounding diameter of over 300 miles. The base of the mountain is surrounded by a cliff that drops 20,000 feet (almost 4 miles). Compared to Mount Everest, the tallest point on Earth at 29,035 feet, Olympus Mons is over three times taller. Another spectacle on Earth is the Grand Canyon which is 277 miles long and 6000 feet deep at its deepest point. On Mars, Valles Marineris is almost 2500 miles long, approximately the width of the United States, and nearly 4 miles (6.5 km) deep. In addition to the surface of Mars dataset, there is a dataset that includes images of the rovers that landed on Mars and the pictures that they took. Another dataset for Mars shows the **crustal magnetic fields of Mars** as measured by the Mars Global Surveyor. This is an important map because it proves that one point Mars had plate tectonics. Red is used for positive magnetic fields and blue is negative fields.

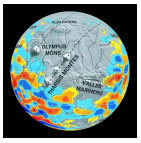
Notable Features

- Olympus Mons: highest point in the solar system at 88,500ft
- Valles Marineris: Canyon 2500 miles long and 4 miles deep
- Hellas Planitia: an impact crater in the Southern Hemisphere 4.3 miles deep and 1400 miles in diameter
- Presence of ice caps

Related Datasets



Mars Landing Sites with Pictures



Mars Magnetic Map 8/2005

Details

Category
Astronomy

Audio
No

Dataset Source
NASA explorations mission

Dataset Developer
NASA

Visualization Developer
David Himes, NOAA/GSD

Contact
David Himes, NOAA/GSD

Directory
FTP Link

KML
KML File

Keywords
Solar System, planet, red, magnetic map